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## A Novel Tissue Engineering Technique to Repair Degenerated Retina

### Grant Award Details

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A Novel Tissue Engineering Technique to Repair Degenerated Retina

**Grant Type:** Inception - Discovery Stage Research Projects

**Grant Number:** DISC1-09912

**Project Objective:** To test the hypothesis that transplantation of retinal organoid's together with polarized sheets of retinal pigment epithelium supported by an artificial Bruch's membrane can prevent a rosette formation which will enhance the survival and functionality of retinal organoid sheets.

**Investigator:**

<b>Name:</b>	Biju Thomas
<b>Institution:</b>	University of Southern California
<b>Type:</b>	PI

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**Disease Focus:** Vision Loss

**Human Stem Cell Use:** Embryonic Stem Cell

**Cell Line Generation:** Embryonic Stem Cell

**Award Value:** \$215,133

**Status:** Active

### Grant Application Details

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**Application Title:** A Novel Tissue Engineering Technique to Repair Degenerated Retina

**Public Abstract:****Research Objective**

Transplantation of human embryonic stem cell (hESC) derived retina organoids (hESC-RO) together with hESC derived retinal pigment epithelium (hESC-RPE) to treat advanced retinal degeneration diseases

**Impact**

Based on the 'proof of concept' experiments in animal models, this novel approach can be translated into a therapeutic product for the treatment of advanced human retinal degenerative diseases.

**Major Proposed Activities**

- Prepare hESC-RPE implants by culturing hESC-derived RPE cells (from Hg cells) on ultrathin parylene. hESC-RO's will be derived from Hg cells (primarily based on the protocol of Zhong et al., 2014)
- A composite graft will be made of hESC-RPE and hESC-RO. A suitable surgical approach will be developed for subretinal placement of the co-graft in rats
- Assessment of visual function in transplanted rats by visual behavioral (optokinetic testing) and luminance threshold mapping of the superior colliculus (electrophysiological recording)
- Conduct morphological assessments of the tissue samples based on immunostaining and confocal microscopic imaging

**Statement of Benefit to California:**

The proposed co-graft approach will lead to the discovery of a new treatment strategy for retinal degeneration diseases such as age-related macular degeneration (AMD) and retinitis pigmentosa (RP). This approach will be beneficial for late stage disease conditions that are considered to be incurable because it requires replacement of both RPE and photoreceptors. By demonstrating the 'proof of concept' in animal disease models, it is easy to translate our findings to human clinical trials.

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